

REMARKS

This paper is responsive to an Office Action mailed March 20, 2008. Prior to this response, claims 1, 3-21, 23, 25-44, and 65-66 were pending. After amending claims 1, 25, 28, 32, 35, and 65-66, claims 1, 3-21, 23, 25-44, and 65-66 remain pending.

In Section 2 of the Office Action claims 25-38 and 65-66 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. With respect to claim 66, the Office Action states that the language in the body of the claim does not necessitate "laterally growing" at any particular time. Since the Applicant intends the claim to recite that the lateral growth occurs as a result of DS annealing, the claim has been amended to recite that lateral growth occurs "in response" to DS annealing. Note: the Applicant is not intending to recite any limitations associated with time, as the lateral growth is dependent upon a number of variables.

With respect to claim 25, 28, 32, and 35, the Office Action states that the claim language can be interpreted to read that the annealing is done at some time after the application of the energy densities, or that the annealing is caused by the energy applied by two different lasers. As with claim 66 discussed above, claims 25, 28, 32, and 35, are not intended to recite a limitation associated with time, as the annealing is associated with variables mentioned in the claims (e.g., energy densities) and unnamed variables.

Practically, since the claims recite the application of two different energy densities, the meaning of "annealing ... in response to the first and second energy densities" (e.g., claim 25) is sufficiently clear.

Support for this limitation can be found on page 23, ln. 8, through page 24, ln. 3. This same analysis applied to claims 28, 32, and 35.

“We have held that a claim is not indefinite merely because it poses a difficult issue of claim construction; if the claim is subject to construction, i.e., it is not insolubly ambiguous, it is not invalid for indefiniteness.” *Honeywell Int’l, Inc. v. Int’l Trade Comm’n*, 341 F.3d 1332, 1338-39 (Fed. Cir. 2003). That is, if the meaning of the claim is discernible, “even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds.” *Exxon Research & Eng’g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001).

Further, whether a claim is indefinite “depends on whether those skilled in the art would understand the scope of the claim when the claim is read in light of the specification.” *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed.Cir.1986). The Applicant respectfully submits that a practitioner in the art would understand that annealing occurs in response to exposure to two energy densities, especially when the claim is read in light of the specification.

With respect to comments made in Section 3 of the Office Action, claim 66 has been amended for greater clarity.

In Section 4 of the Office Action, claims 65-66 have been rejected under 35 U.S.C. 112, first paragraph, as not being enabled in the specification. The Office Action states that the specification does not enable forming a polycrystalline film from unlimited or unspecified

microstructures by techniques other than laser annealing and 2N-shot laser irradiation. In response, the Applicant notes that the fabrication of polycrystalline films, by many different techniques, has been well known in the art for decades.

The Office Action appears to imply that the specification only enables a DS annealing process that occurs after a 2N-shot laser annealing process. Clearly, the explanation of Fig. 6 describes details of DS annealing to remove orthogonal grain boundaries after a 2N-shot process. However, the specification does not describe the grain boundaries resulting from a 2N-shot process as having particularly unique characteristics that differentiate them from the grain boundaries formed by other laser annealing processes. Further, the occurrence of grain boundaries, as formed by many different techniques, would be well known to a practitioner in the art of laser annealing.

Further, the claim is not intending to recite the process by which the first area of Si film is formed. There is no requirement that claim 65 recite the process by which the first area was created, as that is not the subject of the claim.

The first paragraph of 35 U.S.C. 112 states that “(t)he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and set forth the best mode contemplated by the inventor for carrying out his invention.”

Thus, even if the 2N-shot process was the only way of forming the first area of Si film, as implied in the Office Action, the

specification would enable a person skilled in the art to practice the invention of claim 65, which is the use of a DS annealing process to laterally grow crystal grains in a polycrystalline Si film having grain boundaries.

The Office Action also states that claims 65-66 appear to encompass new matter, which is broader in scope than the specification, and ambiguous. In response, the Applicant has amended claim 65 to recite that lateral growth occurs in response to DS annealing. Support for the DS annealing process can be found in the specification on page 5, ln 1, through page 6, ln. 9 (Figs. 1-3). Support is also found in the explanation of Fig. 6 (page 8, ln 1, through page 12, ln. 20) and Fig. 10 (page 13, ln. 26 through page 15, ln. 2). The recitation of the DS annealing process in claims 65 and 66 conforms to the description in the specification.

The Office Action appears to imply that the original claims (i.e., claims 1 and 3) do not provide support for the broader scope of claims 65-66. In response, the Applicant notes that claims 65-66 are supported by the specification. There is no requirement that claims 65-66 be supported by claims 1 and 3.

With respect to the term “grain boundaries”, it is understood in the art that grain boundaries are the region where lateral crystallization comes to a halt. While a polycrystalline film is composed of a number of grains, the parallel alignment crystal grains on the edges of lateral growth annealing is referred to as a grain boundary. The specification defines grain boundaries at page 5, ln. 25 through page 6, ln. 3; page 6, ln. 19, through page 7, ln. 4; page 7, ln. 13-26; and page 8, ln. 1-23, to name a few examples. A more detailed definition of grain boundary

occurs at page 8, ln. 24, through page 9, ln. 9, and page 20, ln. 25, through page 21.

Section 5 of the Office Action appears to object to the statement in the specification that some of the steps may be skipped or performed in parallel. The Office Action states that such a statement makes Fig. 14 an allegedly meaningless jumble of steps that cannot enable a process. In response, the Applicant notes that even without specification, the figure depicts an accurate and detailed process flow that describes one embodiment of the invention. However, not every step in the figure is necessary to support the broadest recitation of the claims. For example, in the broadest explanation of the invention, the specification describes a progression from Step 1404 to 1410. These two steps mirror the first two steps recited in claim 1. In other words, the figure does not supply support for claim 1, unless there is an understanding that Step 1407 may be skipped or performed in parallel with Step 1404. Alternately stated, the Applicant is required to present a specification and figure(s) that support the claims. However, there is no requirement that each claim be supported by a unique figure. Therefore, there are no contradictions in the figure when read in the context of the specification, in support of the claims.

In Section 6 of the Office Action claims 25-38 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. With respect to claim 25, the Office Action states that the description on page 23, lines 8-19, does not enable all possibilities of annealing in response to application of two different energy

densities. Page 23, ln. 8-19, states that annealing occurs as a result of summing the first energy density with an additional energy density. This explanation clearly supports the recitation of “annealing ... in response to the first and second energy densities”. It would be clear to a person skilled in the art that if the first area can be annealed using a single laser, the same area can be annealed by combining the energy densities of the laser with an additional laser or lamp source. This same analysis applies to claim 28.

With respect to claims 32 and 35, the Office Action states that there is no clear relationship expressed between when the laser or lamp is applied with respect to the laser used in the DS process. In response, it is noted that the claims recite that the laser/light is used in the same (DS) process as the second laser. Support for these claims can be found in the specification where it states that Step 1419 applies an additional energy source, either a laser beam or lamp light, to the second area, with the second laser of Step 1418 (page 26, ln. 1-24). It would be clear to a person skilled in the art that if the second area can be annealed using the second laser, the same area can be annealed by combining the second laser with an additional laser or lamp source.

In Section 8 of the Office Action claims 1, 3-21, 23, 25-44, and 65-66 have been rejected under 35 U.S.C. 103(a) as unpatentable with respect to Sposili et al. (“Sposili”; US 6,908,835 or WO 02/086954) in view of Yamazaki et al. (“Yamazaki”; US 5,894,137), and Fukunaga et al. (“Fukunaga”; US 2004/0142543) or Kawasaki et al. (“Kawasaki”; US 6,653,657). The Office Action states that Sposili discloses a SLS process that allegedly includes both a 2N-shot laser annealing process and a DS

annealing process. The Fukunaga, Kawasaki, and Yamasaki references are introduced to address the subject of devices and catalysts. This rejection is traversed as follows.

The Office Action acknowledges that Sposili discloses rotating the substrate 90°, but that it would have been obvious that an equivalent effect would have been expected by rotating the pattern mask. However, mask rotation is not the subject of the Applicant's invention. Claim 1 recites a mask that uses orthogonal apertures, so that neither the substrate nor the mask need be rotated.

An invention is unpatentable if the differences between it and the prior art would have been obvious at the time of the invention. As stated in MPEP § 2143, the *KSR International Co. v Teleflex Inc.* decision (82 USPQ2d 1385, 1395-1397, 2007) suggests 7 exemplary rationales to support a conclusion of obviousness, which include:

A) Combining prior art elements according to known methods to yield predictable results;

B) Simple substitution of one known element for another to obtain predictable results;

C) Use of known technique to improve similar devices (methods, or products) in the same way;

D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on

design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

G) Some teaching, suggestion, or motivation in prior art would have lead one of ordinary skill to modify the prior art reference or the combine prior art references teachings to arrive at the claimed invention.

The Office Action states that modifications to Sposili would have been obvious to one of ordinary skill in the art in light of Yamazaki/Fukunaga/Kawasaki. This rejection appears to be most closely grounded in the G) rationale - Some teaching, suggestion, or motivation in prior art would have lead one of ordinary skill to modify the prior art reference or the combine prior art references teachings to arrive at the claimed invention.

With respect to this rationale, MPEP 2143 (G) states that the rejection must articulate the following criteria to resolve the *Graham* factual analysis:

(1) a finding that there was some teaching, suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings;

(2) a finding that there was a reasonable expectation of success; and

(3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness.

With respect to the above-referenced first factual analysis criteria, the Yamazaki/Fukunaga/Kawasaki references have been combined with Sposili based upon the assumption that the combination discloses every limitation recited in Applicant's claims 1 and 65. However, with respect to claim 1, none of the references disclose a 2N-shot process that is conducted without rotating either the substrate or the mask. The use of a mask with orthogonal apertures is completely unanticipated by any of the references, and results in considerable fabrication efficiencies. With respect to claim 65, none of the references disclose a DS process that is performed on selected regions of a previously annealed polycrystalline film with grain boundaries. Therefore, even if a practitioner would have been motivated to combine these references, that combination does not explicitly disclose every limitation of claims 1 and 65. Claims 3-21, 23, and 25-44, dependent from claim 1, enjoy the same advantages.

The Office Action (Sections 21-22 and 25; mailed 9/19/2006) states that it would have been obvious to apply the subsequent process techniques of Yamazaki, Fukunaga, or Kawasaki with the sequential crystallization process taught by Sposili. However, no support is given in the Office Action for this assumption. A *prima facie* case for obviousness cannot be made without an analysis of how the references can be combined or modified to make the claimed invention obvious. Fukunaga's KrF laser process does not suggest modifications to Sposili's rotation steps that make the use of orthogonal aperture pattern obvious. In fact, the combination suggests that there is no other means for orthogonally

annealing. Neither does Fukunaga's laser process suggest modifications to Sposili's SLS process that make obvious the DS annealing of selected areas of a previously laser annealed polycrystalline film. Likewise, no evidence has been provided that Yamazaki or Kawasaki suggest modifications to Sposili that would make obvious orthogonal aperture patterns, or the use of a DS process to anneal selected areas of a polycrystalline film (claim 1), with grain boundaries (claim 65).

Alternately, a *prima facie* case for obviousness could be based upon evidence that the above-mentioned modifications to Sposili would have been obvious to one with skill in the art based upon what was well known at the time of the invention. "(A)nalysis [of whether the subject matter of a claim would have been obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385, 1396 (2007). However, if the *prima facie* rejection is supported by what was known by a person of ordinary skill in the art, then additional evidence should have been provided. Notable, when the source or motivation is not from the prior art references, "the evidence" of motive will likely consist of an explanation or a well-known principle or problem-solving strategy to be applied". *DyStar*, 464 F.3d at 1366, 80 USPQ2d at 1649.

The Office Action does not mention a principle or problem-solving strategy that a practitioner might follow in modifying the Sposili reference. The Office Action does not supply evidence that it was well known at the time of the invention to use a mask with orthogonal aperture patterns. Neither does the Office Action supply evidence that it

was well known to follow a 2N-shot laser annealing process by a DS annealing process. Finally, the Office Action does not supply evidence that it was well known to selectively anneal a polycrystalline film with grain boundaries using a DS annealing process.

A *prima facie* analysis of motivation is especially critical in the present circumstances since the rejection is predicated on limitations that are not explicitly disclosed in the prior art references. The claimed invention can only be obvious if an artisan makes substantial modifications to the Sposili. However, there is nothing in the Yamazaki/Fukunaga/Kawasaki references that suggests such a modification. Further, no evidence has been provided that such a modification would have been obvious based upon well known principles.

With respect to the second analysis criteria needed to support the G) obviousness rationale, even if a practitioner were given the Yamazaki/Fukunaga/Kawasaki references and combined them with Sposili, no evidence has been provided to show that there is a reasonable expectation of success in the claimed invention. That is, there can be no reasonable expectation of success if the references, and what was known by artisan at the time of the invention, do not teach or suggest all the limitations of the claimed invention.


In summary, the Applicant respectfully submits that a *prima facie* case of obvious has not been supported since the combination of Yamazaki/Fukunaga/Kawasaki with Sposili does not explicitly disclose every limitation of claims 1 and 65. Neither has a case been supported that Sposili can be modified to supply the missing limitations in view of

Yamazaki/Fukunaga/Kawasaki, or what was well known by a person of skill at the time of the invention. Therefore, the Applicant requests that the rejection of claims 1, 3-21, 23, 25-44, and 65-66 be removed.

Applicant asserts that the claims are patentable over the references made of record in Section 6 of the Office Action. It is believed that the application is in condition for allowance and reconsideration is earnestly solicited.

Respectfully submitted,

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